Fall 1998

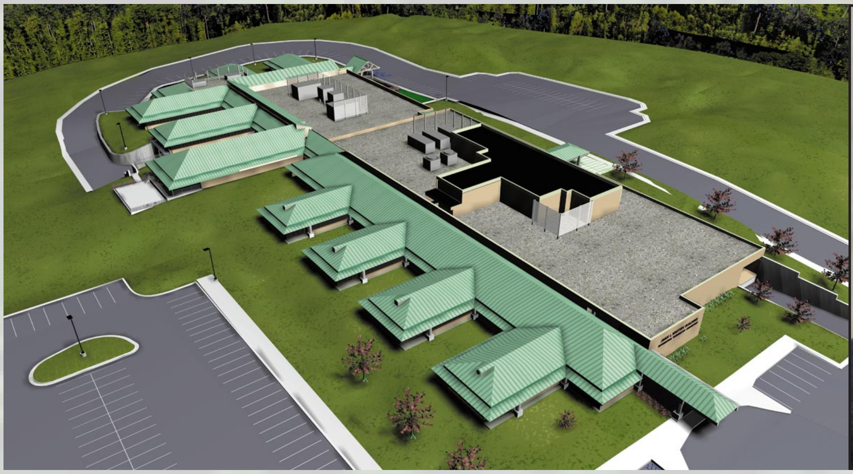
MSRC

CEWES Major Shared Resource Center

U.S. ARMY CORPS OF ENGINEERS, WATERWAYS EXPERIMENT STATION

NEWSLETTER

HPC Challenge Demos at SC98




The CEWES MSRC is located in the Information Technology Laboratory, Dr. N. Radhakrishnan, Director

The CEWES MSRC is located in the Information Technology Laboratory at the U.S. Army Engineer Waterways Experiment Station (CEWES) in Vicksburg, MS. The MSRC houses several of the most powerful High Performance Computing (HPC) systems in the world and provides a technical staff to provide full spectrum support for the Department of Defense (DoD) researcher. This support ranges from Help Desk assistance to one-on-one collaboration.

The Scientific Visualization Center (SVC) is one of the largest, most diverse, and best equipped facilities of its kind based on the latest SGI graphics supercomputers and industry leading visualization software suite. The SVC is staffed with engineers, computer scientists, and visualization specialists to provide the DoD with a source for visualization expertise and capability.

The Programming Environment and Training component of the program provides for transfer of cutting-edge HPC technology from premier university centers; development of parallel programming tools; training DoD users of the MSRC in HPC skills; and collaboration among university and government research teams and Historically Black Colleges and Universities/Minority Institutions.

The Defense Research and Engineering Network (DREN) and the Internet provide international access to the CEWES MSRC HPC systems. Please contact the MSRC Customer Assistance Center for information about accessing the CEWES MSRC resources. The customer support Web site address is *http://www.wes.hpc.mil*. The toll-free customer support number is 1-800-500-4722.

Computational Technology Areas

The DoD user base includes more than 4,200 computational scientists and engineers. To meet the needs of defense scientists and engineers, their applications have been categorized into ten computational technology areas (CTAs). The CEWES MSRC provides primary support for five CTAs:

- Computational Fluid Dynamics.
- Computational Structural Mechanics.
- Climate/Weather/Ocean Modeling and Simulation.
- Environmental Quality Modeling and Simulation.
- Forces Modeling and Simulation.

The Office of the Secretary of Defense is investing in high performance computing to provide the U.S. Military with a technology advantage to support warfighting requirements. The DoD High Performance Computing Modernization Program (HPCMP) provides advanced hardware, computing tools, and training to DoD researchers utilizing the latest technology to aid their mission in support of the warfighter.

The HPCMP has three initiatives: high performance computing centers, which consist of major shared resource centers and distributed centers; the DREN to provide advanced networking capability interconnecting DoD researchers with high performance computing resources; and the Common High Performance Computing Software Support Initiative, a software development program designed to provide technical applications that will exploit scalable computing systems.

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For the past two years, the four MSRCs have been faced with the installation and operation of an enormous influx of new compute, visualization, and storage capability. Just think of it, in early 1996, the MSRCs consisted of a few Cray UNICOS systems and a Paragon. The backlog on the CEWES C90 has fallen from weeks to days, and the scalable compute capability has grown from a single system to the dominant compute capability in the program. The services, agencies, and users have melded into a unified community working together to share their expertise. We have come a long way in two years.

From the perspective of the MSRCs and the distributive centers, we are now focusing on two areas. The first is better integration of resources within each Center and the second is enhanced sharing of resources among the Centers. We have had long discussions about uniformity across the Centers and everyone - especially the users - agrees that uniformity is important. We also recognize that unique capabilities of both systems and staff at each Center provide technical advantages and foster a creative energy that strengthens the program. We do not want to lose this. The two focus areas must be in concert with each other. A single Center can do something to accommodate the needs of some users, but it may be inefficient to try to meet such needs at every Center. System installations have settled down a little in the past few months, and we are up to the challenge. The teams have been formed, the personalities have surfaced, and the expertise has been identified. We need your input, help, and patience, but in general, look for positive change.

In concert with implementing these changes, we recognize the need for training to help the users better understand the changes and best utilize them. Please keep a close eye on our Web page for these training courses. Also, if you have users at your site that will benefit from the training, let us know and we will be happy to come to your site to conduct the training.

Bradley M. Comes
Director, CEWES MSRC

Forces Modeling Simulations Set World Records

Wayne Mastin, Ph.D.

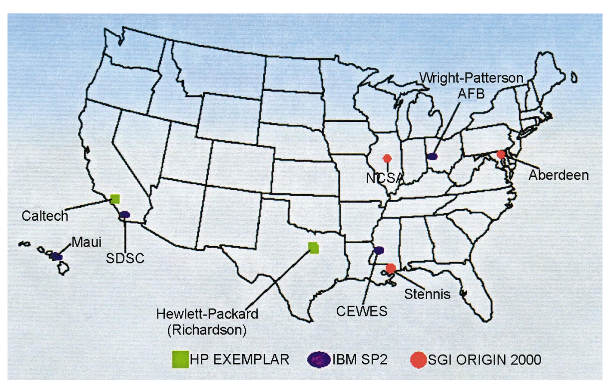
The CEWES MSRC recently made the national news as a significant metacomputer contributor in two world record Forces Modeling Simulations. The simulations modeled the movement of troops, tanks, supply vehicles, and other support vehicles in a military scenario in the Saudi Arabia, Kuwait, and Iran theater of operations.

The first record was broken in November 1997 at the ninth annual Supercomputing Conference held in San Jose, CA. A record simulation of 66,239 entities, including fixed wing aircraft, rotary wing aircraft, fighting vehicles, and infantry, was conducted as part of the DoD contribution to the Conference. The simulation was executed by a Jet Propulsion Laboratory (JPL) team led by Dr. David Curkendall. The computers used for this simulation were the 256-processor IBM SP at CEWES, the 256-processor IBM SP at the Aeronautical Systems Center (ASC), Wright-Patterson Air Force Base in Dayton, Ohio, and two 64-processor SGI Origin 2000s at ASC, all interconnected over DREN, the Defense Research and Engineering Network.

The second record was set in March 1998 at the Technology Area Review and Assessment briefings at the Space and Naval Warfare Center in San Diego. Again, the CEWES MSRC SP was a major player. This simulation was conducted by a California Institute of Technology team led by Dr. Sharon Brunett. A total of 13 computers from 9 different sites were used to host the 100,298-vehicle entity level simulation. A total of 1,386 processors were used in the simulation.

The simulation made use of software developed in the Globus project, a research effort funded by Defense Advanced Research Projects Agency (DARPA), the Department of Energy, and the National Science Foundation to investigate and develop software components for next-generation high performance Internet computing. A list of the sites, numbers of processors, and vehicles simulated appears below.

Site	Computer	Processors	Vehicles
California Institute of Technology	HP	240	21,951
CEWES	SP	232	17,049
Aeronautical Systems Center	SP	130	10,818
Maui High Performance Computing Center	SP SP	148 100	9,485 6,796
Hewlett-Packard Headquarters	HP	128	8,599
University of California, San Diego	SP	100	6,989
National Center for Supercomputing Applications	SGI	128	6,693
Army Research Laboratory	SGI SGI	60 60	4,333 3,347
Naval Oceanographic Office	SGI	60	4,238
Totals		**1,386**	**100,298**



Location of computers used in the simulation

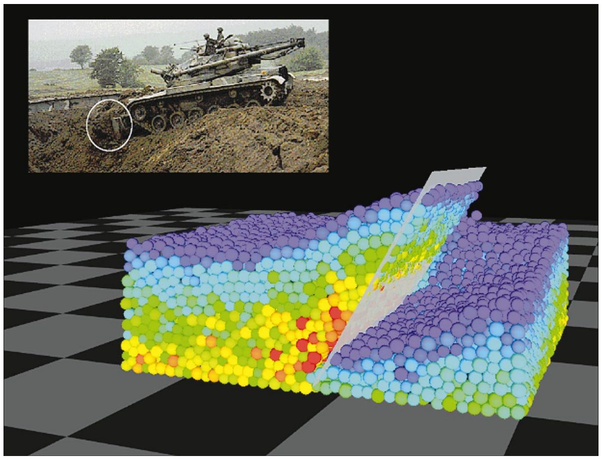
CEWES MSRC Team Wins Army R&D Achievement Award

John West and Alex Carrillo

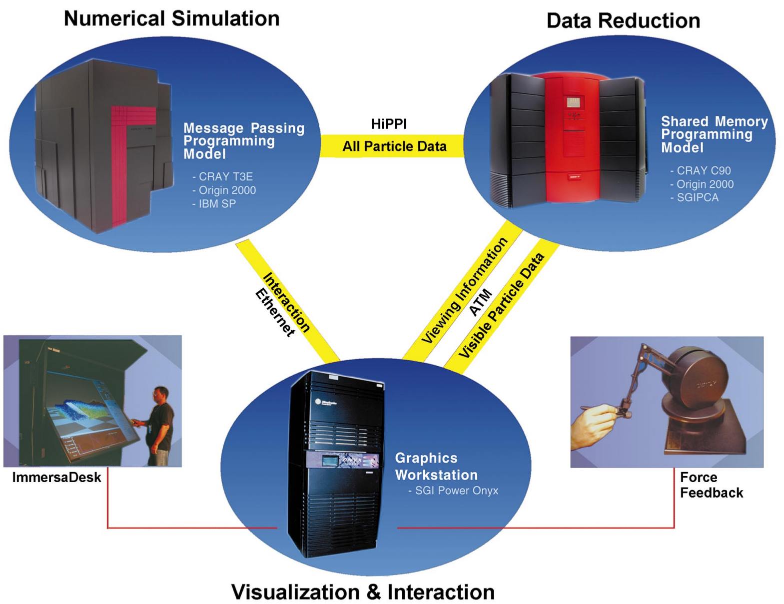
A Department of the Army Research and Development Achievement Award was presented at the 21st Army Science Conference in Norfolk, VA, 15-17 June 1998, to a team of researchers from the CEWES MSRC. The team members honored were John E. West, Alex R. Carrillo, and C. Stephen Jones.

Research and Development Achievement Awards are given for outstanding leadership or achievements in research and development (R&D) that have resulted in improved U.S. Army capabilities and have contributed to the Nation's welfare. The CEWES MSRC award was for a real-time particle simulation system that allows DoD scientists and engineers to visualize and steer the computation of the interaction between military vehicles or vehicle system components and soil particles.

The heart of the simulation is the soil particle program, a discrete element model initially developed by Drs. David A. Horner and John F. Peters of the CEWES Geotechnical Laboratory. The simulation takes advantage of the high performance computing, high-speed networking, and visualization environments at the CEWES MSRC. The system couples heterogeneous parallel computers via high bandwidth networks to create an interactive system to study the interaction between vehicles and soil masses undergoing large, discontinuous deformations. This project is part of an ongoing DoD effort to decrease reliance on full-scale testing in the development of the next generation of vehicles and vehicle-mounted weapons systems through modeling and simulation. The goals are to use "virtual" proving grounds to accomplish the many tasks required to develop a new system from concept to prototype and to shorten the system development cycle.

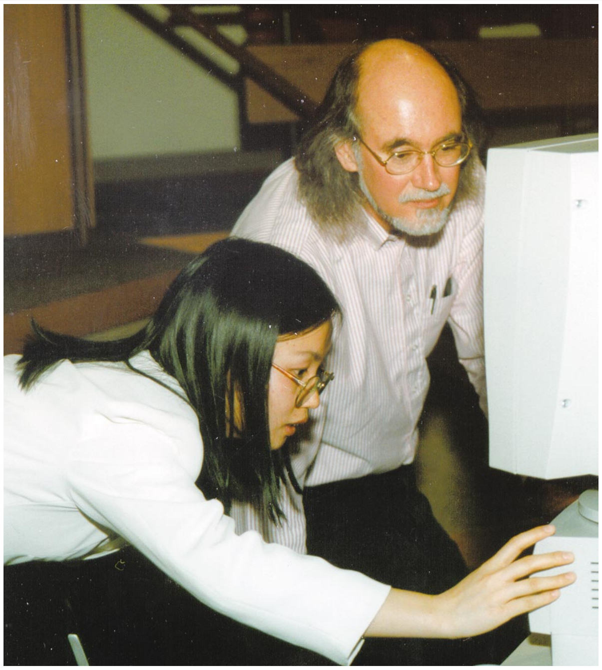


The system employs a collection of high performance parallel computers connected by high-speed networks to perform very large calculations in real-time. It was first demonstrated at Supercomputing '96 in Pittsburgh, PA, where it was used to simulate the behavior of soil particles in a mine plowing exercise. The results of the simulation were transmitted via asynchronous transfer mode (ATM) networks to a workstation that performed the concurrent visualization. The demonstration resulted in a gold medal for the CEWES MSRC team in the Heterogeneous Computing category of the High Performance Computing Challenge at the Supercomputing '96 conference.



PET Sponsors Computational Grid Workshop

Richard Weed, Ph.D.



Larry Thorn, a systems analyst from the University of Texas/TICAM, along with Yuping Zhu, a research scientist at the Northeast Parallel Architectures Center (NPAC) at Syracuse University, view NPAC's Web-based grid information search tool. They were two of the 42 participants in the workshop.

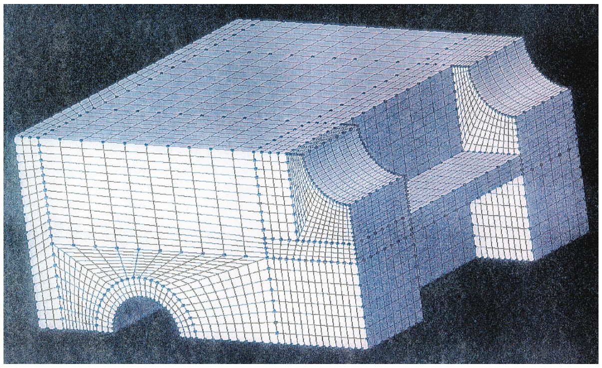
The Programming Environment and Training (PET) component of the CEWES MSRC—along with one of its academic partners, the University of Texas at Austin—sponsored a workshop on DoD requirements for computational grid generation. This workshop was part of a series of PET meetings on topics of importance to DoD researchers who use the unique computational resources of the MSRC.

Computational grids or meshes are needed when using supercomputers to model many defense-related research problems. The generation of large grids is indispensable for scientists and engineers working in DoD technology areas such as computational fluid dynamics, computational structural mechanics, climate, weather and ocean modeling, and environmental quality modeling. DoD and Department of Energy (DOE) scientists project that, within the next few years, the increasing complexity of numerical simulations will require computational grids numbering in the billions of points.

The workshop was conceived and moderated by Dr. Joe Thompson, Founding Director of the National Science Foundation's Engineering Research Center for Computational Field Simulation and a distinguished professor of aerospace engineering at Mississippi State University.

"The focus of the workshop was to bring together DoD, DOE, NASA, and MSRC computational scientists to discuss the current state of the art in computational grid generation, to define required improvements to existing capabilities, and to outline a plan for future research in the field. I was very pleased with the number of scientists and engineers that attended the workshop and the progress that we made outlining our future plans," Thompson said. Participants in the workshop, held at the University of Texas at Austin in March 1998, also included Mississippi State University and Ohio State University, both CEWES MSRC PET academic team members.

The PET program is an integral part of the DoD's High Performance Computing initiative. "The PET program brings together a team of researchers from leading universities and the Department of Defense to provide DoD scientists and engineers with the expertise required to move to the next generation of supercomputers," said Dr. Dick Pritchard, Nichols Research Director of PET.



Grid generated for calculating damage to a deeply buried underground structure from bombs or missile attacks. Such calculations allow U.S. Forces to attack such installations with a high degree of confidence that desired levels of damage will be attained and that collateral damage to surrounding non-target areas will be minimized.

System Upgrade Places CEWES MSRC Among Top Ten HPC Resources

Jim Rogers

A recently completed hardware and software upgrade positions the CEWES MSRC as one of the 10 largest unclassified computing resources in the United States, based on the Numerical Aerospace Simulation Parallel Benchmarks.

Central to the upgrade were the installation of a second IBM SP scalable parallel supercomputer and a substantial upgrade to an existing SGI Origin 2000 distributed shared memory supercomputer. These upgrades push the peak computational capability of the CEWES MSRC to more than 583 billion floating point operations per second (GFLOPS). The aggregate HPC memory capacity increased by more than 110 GBytes (to 485 GBytes), and more than 2.5 TBytes of HPC disk capacity was added.

At the heart of the Center's computing environment is a high performance high-availability file server (HAFS). Based on two SGI Origin servers and SGI's FAILSAFE software, the HAFS Network File System (NFS) serves a common home directory structure and dedicated work areas to any of the Center's six supercomputers across multiple high-speed network connections. Nearly 1 TByte of Fibre Channel-attached disk provides sustained high performance for the accounts of more than 2,000 active users.

Dr. Radhakrishnan, Director of the Information Technology Laboratory, which houses the CEWES MSRC, informs visitors of the new IBM SP scalable computer—part of the effort to push our computational capability to new heights.

Origin 2000

To better serve the expanding visualization and rendering requirements of its users, the Center has also significantly upgraded its Scientific Visualization Center (SVC) and Video Production Facility. The upgraded configuration provides a high-end Onyx server configuration with 12XR10000 processors, and 4 GBytes RAM and two Onyx systems configured with 6XR10000 processors and 1 GByte RAM each. Three Silicon Graphics dual-processor Octane workstations were added, and four Silicon Graphics Indigo2 workstations were upgraded to R10000-based platforms. The resulting configuration will support the visualization of the multi-gigabyte data sets being produced by the Center's HPC users.

The Video Production Facility upgrade is focused on an end-to-end digital backbone and the integration of the Sony ES-7 Non-Linear Editing System. Complementing the non-linear digital system are a DVCAM-format video camera and videotape recorder. These new systems will support the CEWES MSRC's requirement to deliver high-quality animation and visualization and live video coverage in a fully digital environment.

SC 8 HPC Challenge Award
Most Effective Engineering Methodology

Mary Gabb

The CEWES MSRC has flexed its computational muscles once again. The HPC challenge team (shown below) won the prestigious “Most Effective Engineering Methodology” award for the high performance computing challenge at SC98, held November 7-13 in Orlando, Florida.

The CEWES MSRC team demonstrated the latest in HPC technology by modeling wave motions from a dangerous inlet off the Florida coast. Ponce Inlet is notorious for patches of rough water, which have capsized boats as they enter or leave the inlet. The advanced programming techniques used in the demonstration reduced the calculation times by orders of magnitude—in this case from 6 months to 3 days. Reducing calculation times also makes modeling larger bodies of water, such as an entire coastline, feasible.

“We selected a code used by the Navy for forecasting and analysis of harbor conditions. So it was not an academic test problem; it was something of real use,” says Dr. Steve Bova, HPC challenge team leader at CEWES MSRC. “This type of research has many applications for the Department of Defense. The military wants to locate dangerous areas of water so they won’t moor a ship there, for example, or send a team of Navy SEALs or Army Rangers through that area,” says Dr. Henry Gabb, a member of the MSRC project team. Other applications include prevention of erosion along the ocean floor in turbulent areas, and marking a safe navigation channel with buoys.

The CEWES MSRC scientists used a program called CGWAVE, developed by Dr. Zeki Demirbilek of the Coastal and Hydraulics Laboratory at CEWES. The application predicts harbor conditions from the pattern of waves, called a “wave component,” in the outside sea, taking into account the harbor shape and man-made structures such as piers and naval vessels. CGWAVE allows scientists to model what is happening in a harbor at any given moment (nowcasting), as well as predict what will happen under a certain set of circumstances (forecasting).

Contest participants presented their latest cutting-edge work to a panel of judges comprised of industry, university, and government laboratory representatives. It was one of nine demonstrations, with participants from around the world, competing for the award.

The MSRC team members are employed by various institutions throughout the country, but they work together at CEWES. Team members include (left to right): Christine Cuicchi (WES Information Technology Laboratory), Dr. Henry Gabb (Nichols Research Corporation), Dr. Steve Bova (Mississippi State University), Dr. Clay Breshears (Rice University), and (not shown) Dr. Zeki Demirbilek (WES Coastal and Hydraulics Laboratory).

Historically, a lack of computing power has limited the predictive capability of the model because the calculations take so long. Advances in the DoD HPCMP computing capabilities, coupled with the engineering methodology, made the HPC advancement possible. Using the CGWAVE program, the team combined OpenMP (developed using the KAP/Pro Toolset by Kuck & Associates, Inc.) and MPI to do the simulation. “We used MPI to distribute the work. It was a simple boss-worker strategy to balance the workload,” says Dr. Bova. “MPI is used on multiple wave components at the same time. OpenMP gets back the answer to any one component more quickly.”

The team also performed the simulations using computers in two different locations—at the CEWES MSRC and the Aeronautical Systems Center MSRC in Dayton, Ohio—simultaneously. They used SGI/CRAY Origin 2000s because shared memory was required for the nested parallel model. “We couldn’t get dual-level analysis without it [a shared memory platform]. And it’s scalable.” MPI_Connect, developed by Dr. Graham Fagg of the University of Tennessee Knoxville, is a set of functions that connects multiple parallel supercomputers to work on a large-scale simulation. Dr. Clay Breshears, another CEWES MSRC team member, says, “MPI_Connect opens up the scalability of the problem to virtually infinity—as many machines as you can use can be harnessed to a computation.”

OpenMP and MPI are a powerful combination. The SC98 challenge demonstration was the first time the two standards have been used together, and the results were astounding. “This was the first ‘real world’ demonstration of the feasibility and effectiveness of combining OpenMP and MPI,” says Dr. Steve Bova, the MSRC challenge project team leader. “We can now solve problems that coastal analysts could never solve before.”

The demonstration included a state-of-the-art visualization of the harbor and its waves, showing the areas of greatest wave height. The data was also explored using an ImmersaDesk (Pyramid Systems, Inc.) visualization system, which provided an interactive, 3-D rendering of the inlet and the computed solution.

A History of Trou le

Treacherous waters have long beleaguered Ponce Inlet. As early as the 1500s, records indicate that the entire French fleet of Admiral Jean Rebault was wrecked by a hurricane in this area. In July 1997, the federal government issued a $3.5 million grant to repair the inlet’s north jetty, which was causing navigational and safety problems.

The inlet first earned the title “Mosquito Inlet” (“los mosquitos”) by Captain Antonio de Prado in 1569 because of the abundance of insects. Located just over an hour northeast of Orlando, the inlet was ultimately named for Ponce de Leon, discoverer of Florida and seeker of the “fountain of youth.”

Today, the inlet boasts a historic lighthouse, maintained by The Ponce de Leon Inlet Lighthouse Preservation Association. The first lighthouse was originally built in 1835, after Congress appropriated the $11,000 for its construction. Weakened by hurricane damage, it was replaced in 1887. To access its spectacular views of the inlet, however, you had better be prepared to climb 203 steps!

CEWES MSRC and Jackson State University Test Emerging Internet Technology for Distance Learning

Richard Pritchard, Ph.D.

Developing World Wide Web technology for two-way communication via the Internet is making it possible for professors at Syracuse University in New York state to teach a computer science class to students at Jackson State University (JSU) in Mississippi —more than 1,000 miles away.

The Distance Education Partnership project has enabled Syracuse-based instructors to teach two full-semester academic-credit courses for JSU. Project partners include the JSU Computer Science Department, the Northeast Parallel Architectures Center (NPAC) at Syracuse University, and the CEWES MSRC.

"Distance education is not a new idea, but the Syracuse-Jackson State effort is unique because it uses newly emergent technologies developed by researchers at NPAC for collaboration and education delivery over the Internet," said Dr. Dick Pritchard, Director of Programming Environment and Training (PET) at the CEWES MSRC.

"Along with the new NPAC technologies, we are also using hypertext markup language, the programming language of the World Wide Web, and Java, which together with the NPAC Internet collaborative tools provide an interactive teaching environment capable of utilizing a whiteboard for written messages between instructors and students and two-way audio and video using computer workstations and the Internet," Pritchard said.

In the near future, this same technology will be used to provide advanced educational opportunities to government researchers, academic institutions, and business and industry regardless of their location.

Dr. N. Radhakrishnan, CEWES MSRC Site Manager and Director of the CEWES Information Technology Laboratory, explained the importance of the project to defense-related research. "We consider this activity to be of primary significance in achieving our goal of minimizing the importance of place for our DoD research and development community. The DoD is monitoring the progress of this project to produce new distance learning solutions for geographically distributed laboratory personnel."

The Distance Learning project was funded under the PET portion of the HPCMP, which supports technology transfer from university high performance computing centers to the DoD. Initial development of the technologies and the course materials was funded by the U.S. Air Force Rome Laboratory and the Syracuse University College of Engineering and Computer Science.

The Syracuse-based instructors are Professor Geoffrey Fox (Director of NPAC), Dr. Nancy McCracken, and Tom Scavo. Dr. Debasis Mitra serves as the course coordinator, with Mike Robinson as the Network Training Lead at Jackson State.

Distance education via the Internet uses many of the same teaching tools of the traditional classroom. With NPAC technologies, students are able to interact with the professor using two-way audio and video, and a whiteboard for written messages between students and instructors.

CEWES MSRC Hosts 8th DoD HPC Users Group Conference

Michelle Morgan Brown

The CEWES MSRC hosted the Eighth DoD High Performance Computing Users Group Conference in Houston, TX, during the week of June 1-5. The conference was held at Rice University, which is a CEWES MSRC university partner. The event attracted more than 300 attendees from across the country, including users from all four MSRCs and fourteen DoD Distributed Centers.

Rice University campus

The purpose of the conference is to highlight research from various computational technology areas, DoD Challenge Projects, and the Common High Performance Computing Software Support Initiative. The event included presentations by Tom Dunn, HPC Modernization Program Director, and Rice University Professors Richard Smalley, 1996 Chemistry Nobel Prize Laureate, and Ken Kennedy, Director of the Center for Research on Parallel Computation. Over forty technical presentations were given at the conference, many of them by the CEWES team. While in attendance, users also had the opportunity to attend training seminars, meet with contemporaries, and engage in collaborative discussions.

Keynote speaker was Rear Admiral Paul Gaffney, Chief of Naval Research and Manager of the Science and Technology Program of the Navy and Marine Corps. RADM Gaffney stressed the importance of the scientific and engineering research being performed by DoD users. “We in the military understand the critical importance of high performance computing to the national defense,” Gaffney remarked.

The CEWES MSRC team contributed greatly to the week-long event by coordinating the meeting, providing technical support, presenting papers, and providing tutorials. Members of the CEWES MSRC organized and implemented registration procedures and provided on-site assistance for attendees as well.

“The users I spoke with were impressed with the quality of the demonstrations and tutorials, the caliber of the attendees, and the conference as a whole,” observed David Stinson, coordinator for host organization CEWES.

Rear Admiral Paul Gaffney, keynote speaker, stresses the importance of HPC to the national defense.

The Users Group Conference provides a forum for both structured and informal collaborative discussion.

Visualization at CEWES MSRC

Kent Eschenberg, Ph.D.
Mike McCraney
Phil Bording, Ph.D.

In the world of high performance computing, scientific visualization is not just useful; it is essential to putting massive amounts of data into a visual form that can be understood and analyzed. A scientific visualization team at the CEWES MSRC is utilizing high-end computers to explore solutions to some of the most complex DoD engineering design and scientific research problems.

The challenge facing CEWES MSRC scientific visualization experts is the creation of still and animated images that present data in a way that is useful to scientists and engineers throughout the DoD. These images enable DoD researchers to better understand the tremendous amounts of data generated by the MSRC's high performance computers, which include the CRAY C916, the CRAY T3E, the SGI Origin 2000, and the IBM SP.

The Scientific Visualization Center (SVC) at CEWES is an integral part of the DoD MSRC, which is located in the Information Technology Laboratory. The SVC has a reputation for consistently meeting the challenge of creating high-quality graphics and animations for DoD scientists and engineers working in critical technology areas. Visualizations from simple plots to complex three-dimensional fly-throughs of large, animated scientific data sets are supported through collaborative efforts between scientific visualization experts and MSRC users. The SVC staff includes engineers, computer scientists, visualization experts, and artists. This team has the essential expertise necessary to collaborate with scientists and engineers to interpret results from large computational investigations performed on high performance computers.

Four DoD high performance computing centers, including CEWES MSRC, are linked to the DoD user community by an advanced computer network. Together, the Internet and the new DoD high-speed network called DREN (Defense Research and Engineering Network) make the four MSRCs accessible to DoD researchers from coast-to-coast. The DoD high performance computer resources and the scientific visualization centers give the U.S. warfighter a distinct advantage on the battlefield of the future by maintaining technological supremacy in weapon design and by providing the capability to utilize advanced technology on land, sea, and air.

Dr. Kent Eschenberg, Senior Scientific Visualization Specialist, notes that, "Scientific visualization plays two major roles at the CEWES MSRC: as a tool for analyzing data and for presenting data. In its role in analysis, visualization is useful for looking at the low-level numbers, while developing and verifying algorithms, and as well as for high-end analysis to understand the physical phenomenon under study."

For example, the SVC recently assisted the U.S. Army Groundwater Modeling Technical Support Center, located at the CEWES Coastal and Hydraulics Laboratory, in the production of a video demonstrating the capabilities of the Groundwater Modeling System (GMS). Using data sets directly from the GMS, the SVC created subsurface animations depicting the flow of a contaminant plume from a site with contaminated groundwater resources (Figure 1). Three different

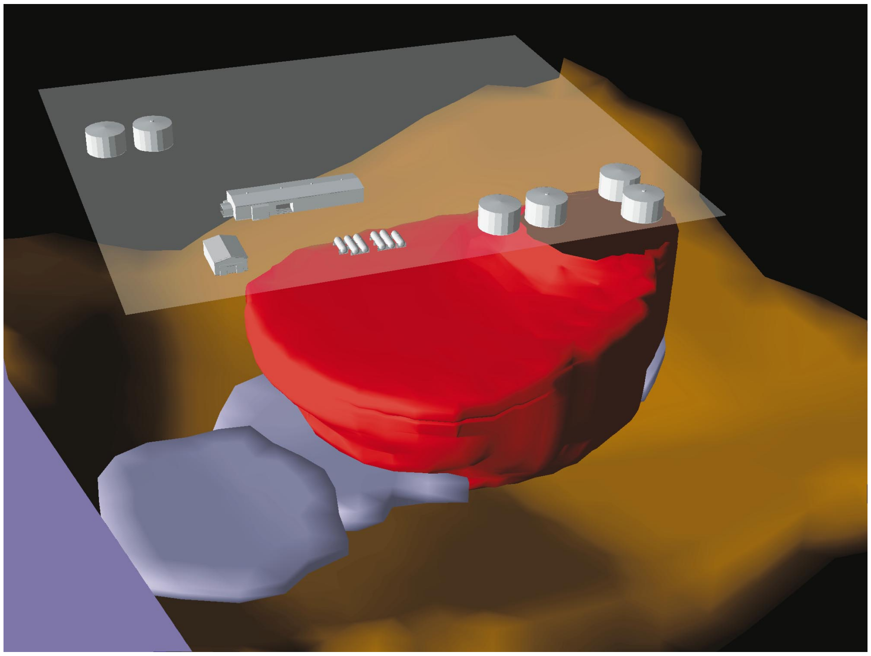


Figure 1. Contaminant plume contours

scenarios were investigated to assess various cleanup methods and time frames. This video presentation will be used to demonstrate to DoD installations how the advanced modeling and simulation capabilities found in GMS can help manage environmental remediation operations.

Another example of the SVC enabling researchers to better visualize their results is the project in which a Stanford University team sponsored by the Office of Naval Research created a simulation of a supersonic jet engine exhaust to study the formation of acoustic shock waves. A subset of the original terabyte data set was selected and displayed (Figure 2) using software from Advanced Visual Systems (AVS) and software written by the SVC staff. The resulting package enables the researcher to follow his or her intuition and to immediately see the results by rotating the objects, grids, etc., all in three dimensions.

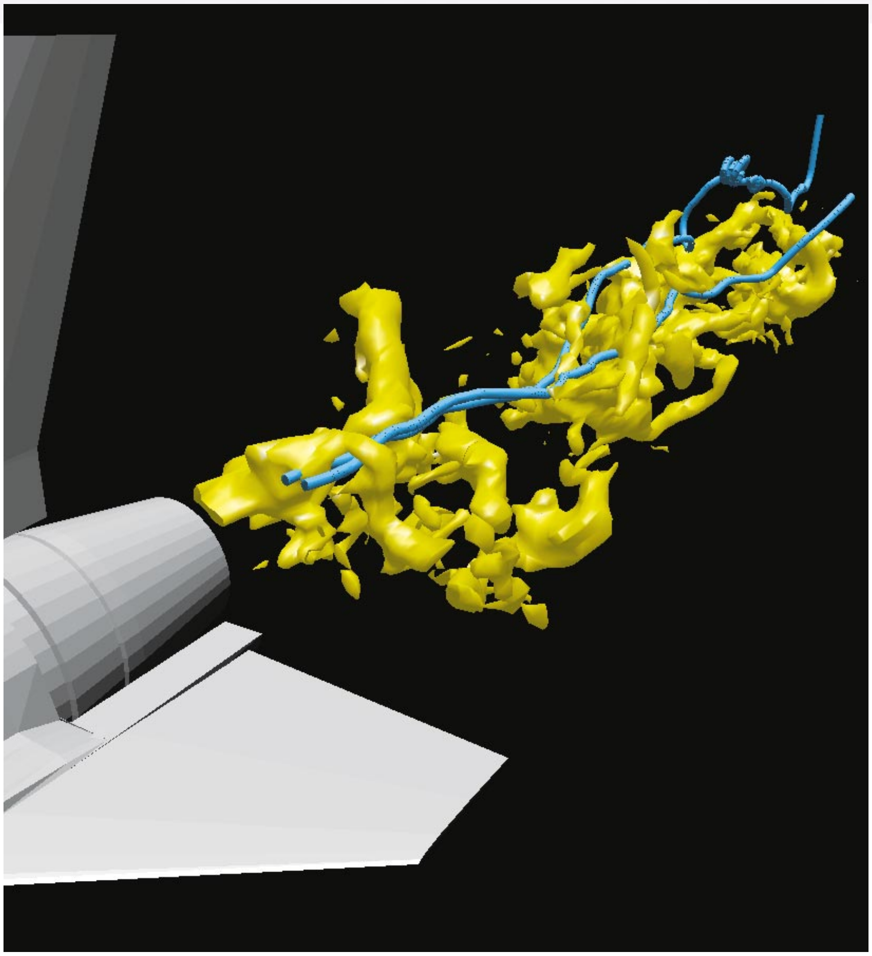


Figure 2. Jet engine exhaust simulation showing creation of supersonic acoustic shock waves at Mach 1.9

The second major role for the SVC is in the presentation of results. This role cannot be ignored since high-profile projects are subject to regular high-level management review. Scientific visualization can bridge the gap between the details and overall impact of the research. Good presentations, including quality graphics and animations, are also vital to working with the general scientific community at conferences and seminars.

The CEWES MSRC Scientific Visualization Center provides users with the tools necessary to effectively analyze information and present results. To ensure user success, a full suite of visualization, animation, and computer-aided design/engineering application packages are available on the systems as well as compilers, graphics tools, and libraries. A fully integrated, broadcast quality Video Production Facility completes the SVC, providing DoD users with the capability to compose broadcast quality videotape demonstrations combining live video, graphic visualization, graphic animation, sound effects, and narration.

CEWES MSRC Users Have Helping Hand in Customer Assistance Center

Mike Gough

The Customer Assistance Center (CAC) is the user's advocate at the CEWES MSRC. The CAC's primary focus is to listen to the needs of the users on an individual basis and then convey those needs to the appropriate expertise in the Center. The CAC is responsible for four areas of support: account administration, technical support, technical documentation, and software configuration management. Five "front-line" technical support analysts staff the CAC from 6:00 a.m. to 7:00 p.m. CST daily, except weekends and government holidays. The analysts receive both E-mail and telephone requests for assistance and are tasked with responding quickly and accurately to comments and problems.

Requests are entered into a call-ticket database and then tracked through the database as solutions are reached so that users can be notified in a timely manner. The CAC uses a layered support approach. Some problems and questions can be addressed directly by CAC personnel, while other requests are forwarded by CAC to a second layer of expertise, the applications analysts. Some of the requests are resolved at this level. Requests that require the attention of system administrators are forwarded to the specific group of administrators assigned to the particular system involved.

Hardware and third-party software problems that cannot be resolved by systems and applications personnel are forwarded to on-site vendor representatives and/or applications specialists provided by the Programming Environment and Training, Computational Migration Group, or Computational Science and Engineering components. This four-level layered approach has been quite effective in providing users with the proper level of expertise in a timely manner.

The software currently used for call-tracking maintains a database of user questions and resolutions, user account information, project account information, and project allocation data. The database can also be used to quantify user response in support of trend analysis.

In addition to the front-line CAC staff mentioned above, other staff members focus on documentation, software configuration, and account administration. Documentation for each of the Center's six systems is provided on-line and via the Center's Web site. These documents are constantly under revision to keep pace with the dynamic nature of the modernization program. Account administration tasks involve approximately 242 projects, 970 users, and 2,074 user accounts.

Software configuration management involves the installation, warranty, and maintenance of approximately 57 third-party software packages. This task requires an extensive database of the status and points of contact for each package.

The four-level, layered support — first addressed by "front line" technical support analysts and, where appropriate, additional specialized personnel — provides unique solutions to individual problems. This strategy has resulted in a 91-percent approval rating from the quarterly customer survey.

A customer satisfaction survey is conducted quarterly, and the most recent survey revealed that more than 91 percent of respondents rated the CEWES MSRC CAC as excellent or good in courtesy, knowledge, and overall customer support quality. The goal of the CAC is to evaluate every problem and provide a solution in the shortest time available. The challenge is to deliver this goal in the dynamic CEWES MSRC environment. More information about the Customer Assistance Center can be found on the Web at http://www.wes.hpc.mil or by calling 1-800-500-4722.

CEWES MSRC Newsletter Editorial Staff

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Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the DoD. Your comments, ideas, and contributions are welcome. Design and layout provided by the Visual Production Center, Information Technology Laboratory, U.S. Army Engineer Waterways Experiment Station.

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